16036 - Mapping Clouds on a Variable Planetary-Mass Companion

Cycle: 27, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) VHS1256-1257B	WFC3/IR	3	30-Apr-2020 13:00:22.0	yes
02	(1) VHS1256-1257B	WFC3/IR	2	30-Apr-2020 13:00:24.0	yes
03	(1) VHS1256-1257B	WFC3/IR	2	30-Apr-2020 13:00:26.0	yes
04	(1) VHS1256-1257B	WFC3/IR	2	30-Apr-2020 13:00:28.0	yes
05	(1) VHS1256-1257B	WFC3/IR	2	30-Apr-2020 13:00:29.0	yes
06	(1) VHS1256-1257B	WFC3/IR	2	30-Apr-2020 13:00:31.0	yes
07	(1) VHS1256-1257B	WFC3/IR	2	30-Apr-2020 13:00:33.0	yes

15 Total Orbits Used

ABSTRACT

Time-series observations of rotational modulations in brown dwarfs and planetary-mass companions are a powerful tool to characterize ultra-cool atmospheres. In particular, the chromatic variations in variability amplitudes place strong constraints on the properties of heterogeneous clouds, and the temporal evolution of the lightcurve directly probes the physical processes that drive atmospheric circulation. We recently discovered that a planetary-mass companion has a J-band variability of more than 22%. This is so far the largest variability amplitude discovered for a PMC and offers the best opportunity for a detailed characterization of an ultra-cool, very low surface gravity atmosphere.

We propose fifteen orbits HST/WFC3/IR G141 time-series observations of this companion. We have developed a seven-visit strategy to establish a time baseline of ~60 hrs, which will continuously monitor our target for two rotation periods. These spectrally-resolved rotational modulated variability measurements will provide a measure to distinguish and characterize multiple aspects of atmospheric heterogeneity. This precise light curve will determine this object's circulation patterns. This object will also be monitored by Spitzer at 4.5-micron band in the near future through a compleetary program. This proposal and the Spitzer observations together will determine this object's mid- to long-term atmospheric evolution. Importantly, this object is also a JWST ERS program target which will result in a high-quality 2 to 28 micron JWST spectrum. The atmospheric structures and their temporal evolution revealed in these observations will provide crucial context for interpreting its JWST spectrum.

OBSERVING DESCRIPTION

Instrument

Measuring VHS1256b's rotational modulations in the 1.4-micron water absorption band is an essential component of our experiment. Therefore, we choose WFC3 and its G141 grism because of their wavelength coverage and excellent photometry performance. As shown in the Cycle25 observations of VHS1256b, WFC3/G141 spectral time-series detected VHS1256b's NIR color and water depth modulations at high fidelity. We will adopt RECTE model \citep{Zhou2017} to correct the systematics in the time series data and ensure full data usage. We opt to use the 256x256 subarray to avoid in-orbit buffer downloads. For wavelength calibration, at the beginning of each orbit, we will include two or three short direct-imaging observations in the F132N filter with the same aperture and subarray as the spectroscopic exposures.

Visit planning

We split the 15 orbits observation into seven visits. Because the instrument systematics is more significant at the beginning of the observations, we plan three orbits for the first visit and two orbits for the remaining six visits. We allow two- to four-orbit gaps between any adjacent visits in the first

four visits and five to seven orbit gaps between adjacent visits in the remaining three visits. There are three main purposes for this design. First, it ensures a fine temporal sampling of the first rotation period, which enables detailed analysis and mapping of the heterogeneous atmosphere of VHS1256b for one full rotation. Second, this design provides a total time baseline of ~60 hr, which is sufficient to cover two rotation periods of VHS1256b and determine the atmospheric evolution on this timescale. Third, scheduling flexibility is increased under this design compared to a continuous 15 orbits long sequence. The impact of passing the South Atlantic Anomaly can thus be mitigated.

Exposure time and SNR estimates

We estimate exposure time and the expected signal-to-noise ratio based on the archival spectrum of VHS1256b. For spectroscopic exposure, we will use SPARS25 sample sequence with NSAMP of 11, which is equivalent to an exposure time of 223 seconds. Based on the WFC3 exposure time calculator estimates, this exposure time will yield an SNR of 70 per spectral element or SNR>500 for the 1.1 to 1.7 micron broadband at a cadence of 240 seconds. The SNR and cadence are comparable to previous HST/WFC3/G141 light curves of variable brown dwarfs that are used for top-of-atmosphere map retrieval.

Roll angle constraints

To reduce the effect from flat field uncertainties, we request the telescope roll angle to be fixed for the entire observation and also request no dithering to be applied. VHS1256b and its host binary are separated by 8.1 arcsec with a position angle of 218 degrees. The most ideal telescope position angle (U3) is 173.1 or 353.1 degrees. To avoid host binary spectral trace contaminating that of the companion, we request at least 30 pixels separation between the traces of the companion and primary spectra, and thus request the telescope orientation (U3) to be 113 to 233 degrees or -67 to 53 degrees. If scheduling permits, the telescope roll should be as close to 173.1 or 353.1 degrees as possible. Also if possible, telescope pointing for the entire seven visits observations should be kept the same.

Visit

Proposal 16036, Visit 01, implementation Thu Apr 30 17:00:34 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: PCS MODE FINE; ORIENT 113D TO 233 D; ORIENT 293D TO 359.9 D; ORIENT 0D TO 53 D

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	VHS1256-1257B	RA: 12 56 1.4656 (194.0061067d)	Proper Motion RA: -285.4 mas/yr	V=22	Reference Frame: ICRS
		Dec: -12 57 31.65 (-12.95879d)	Proper Motion Dec: -189.2 mas/yr	J=16.66 mag	
		Equinox: J2000	Epoch of Position: 2019.85		

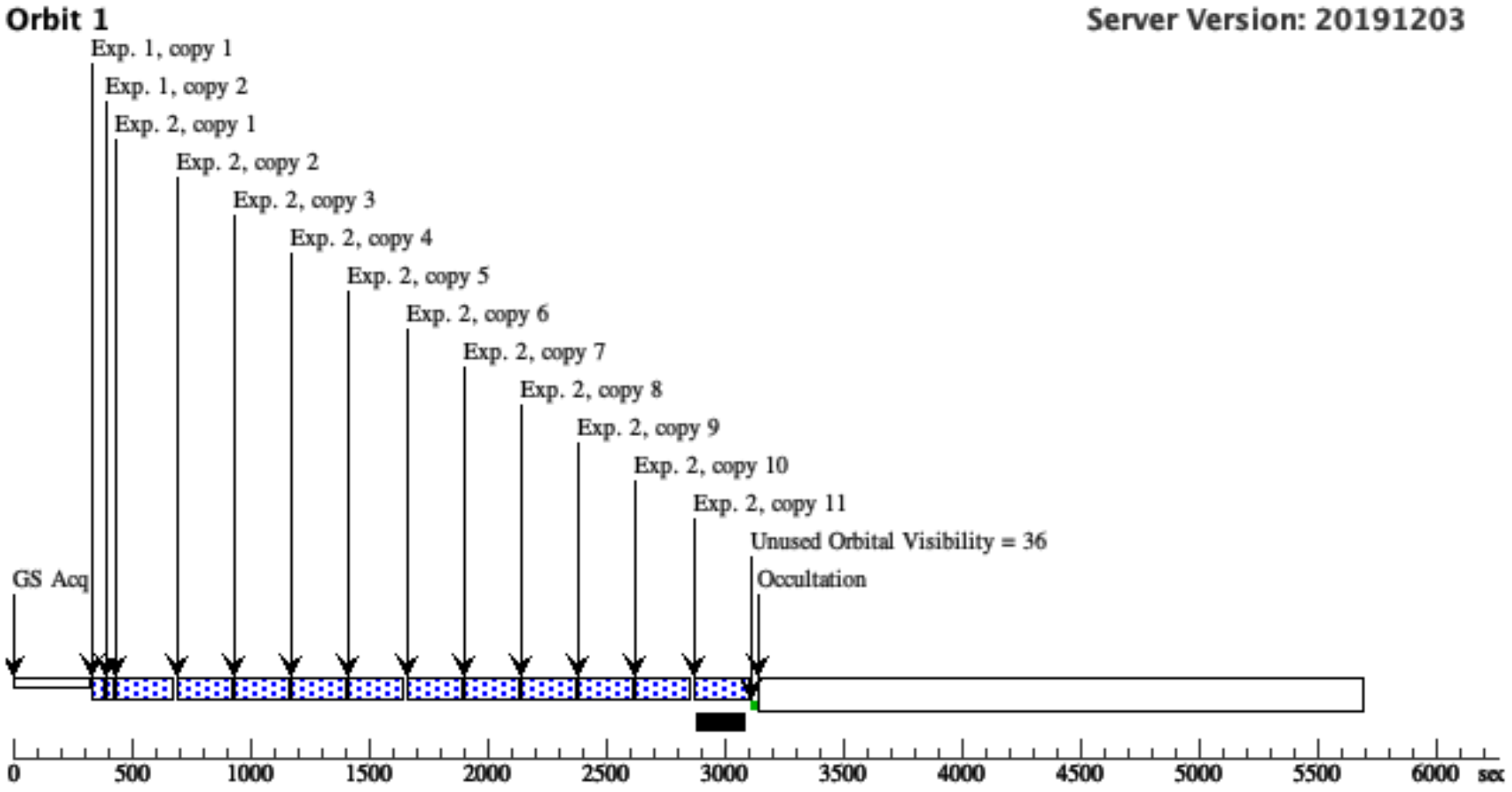
Comments:
Category=STAR
Description=[BROWN DWARF, EXTRA-SOLAR PLANET]

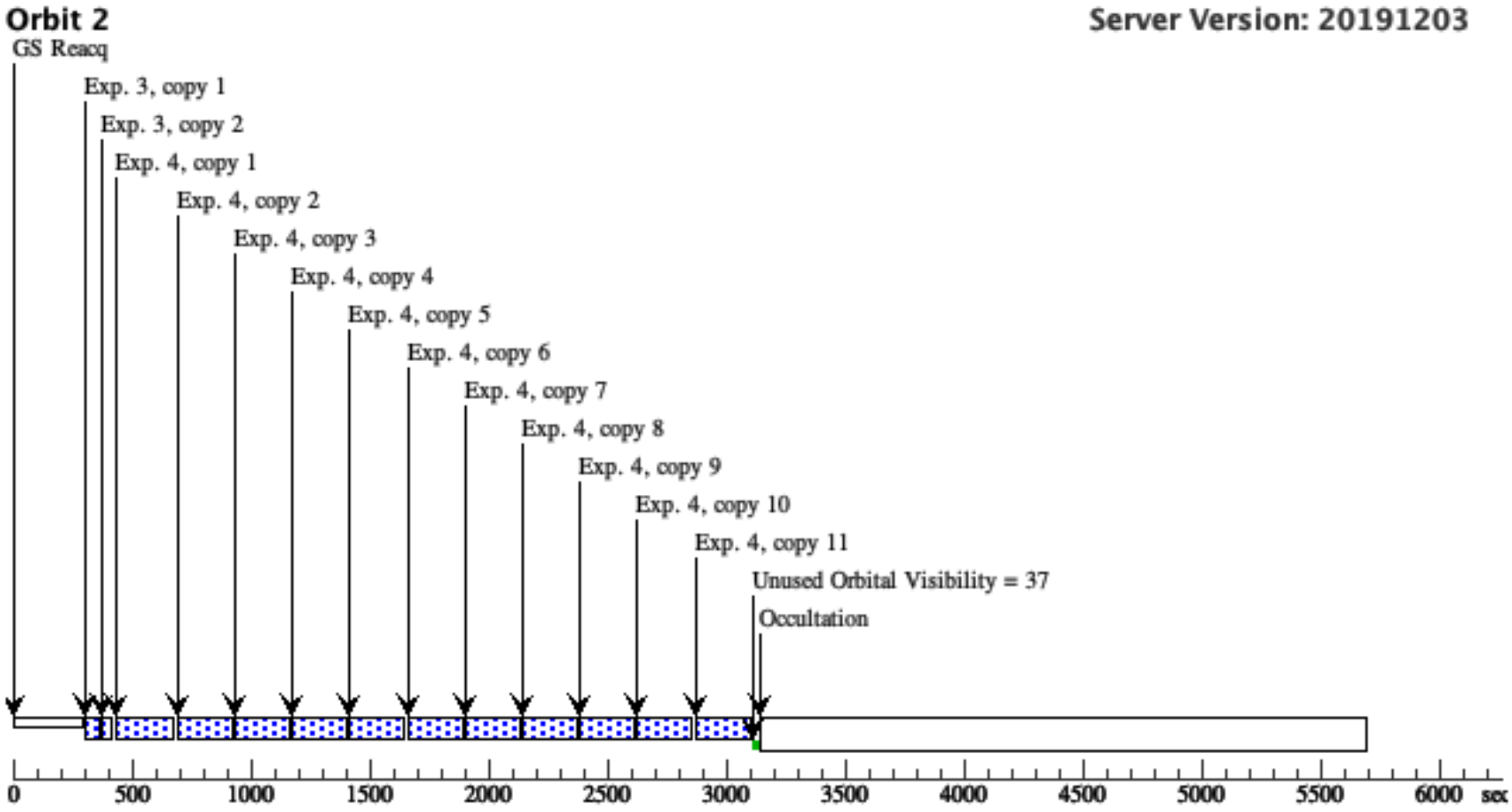
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	F132N	NSAMP=4; SAMP-SEQ=SPARS10			22.317276 Secs X 2 (44.635 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	 ***[1]***
2		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS25; NSAMP=11			223.738205 Secs X 11 (2461.12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]*	 ***[1]***
3		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	F132N	NSAMP=6; SAMP-SEQ=SPARS10			37.01025 Secs X 2 (74.02 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	 ***[2]***
4		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS25; NSAMP=11			223.738205 Secs X 11 (2461.12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]*	 ***[2]***
5		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	F132N	NSAMP=6; SAMP-SEQ=SPARS10			37.01025 Secs X 2 (74.02 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	 ***[3]***

	6	(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS 25; NSAMP=11	223.738205 Secs X 11 (2461.12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]*	 ***[3]***

Orbit Structure

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Exp. 4, copy 6
Exp. 4, copy 7
Exp. 4, copy 8
Exp. 4, copy 9
Exp. 4, copy 10
Exp. 4, copy 11
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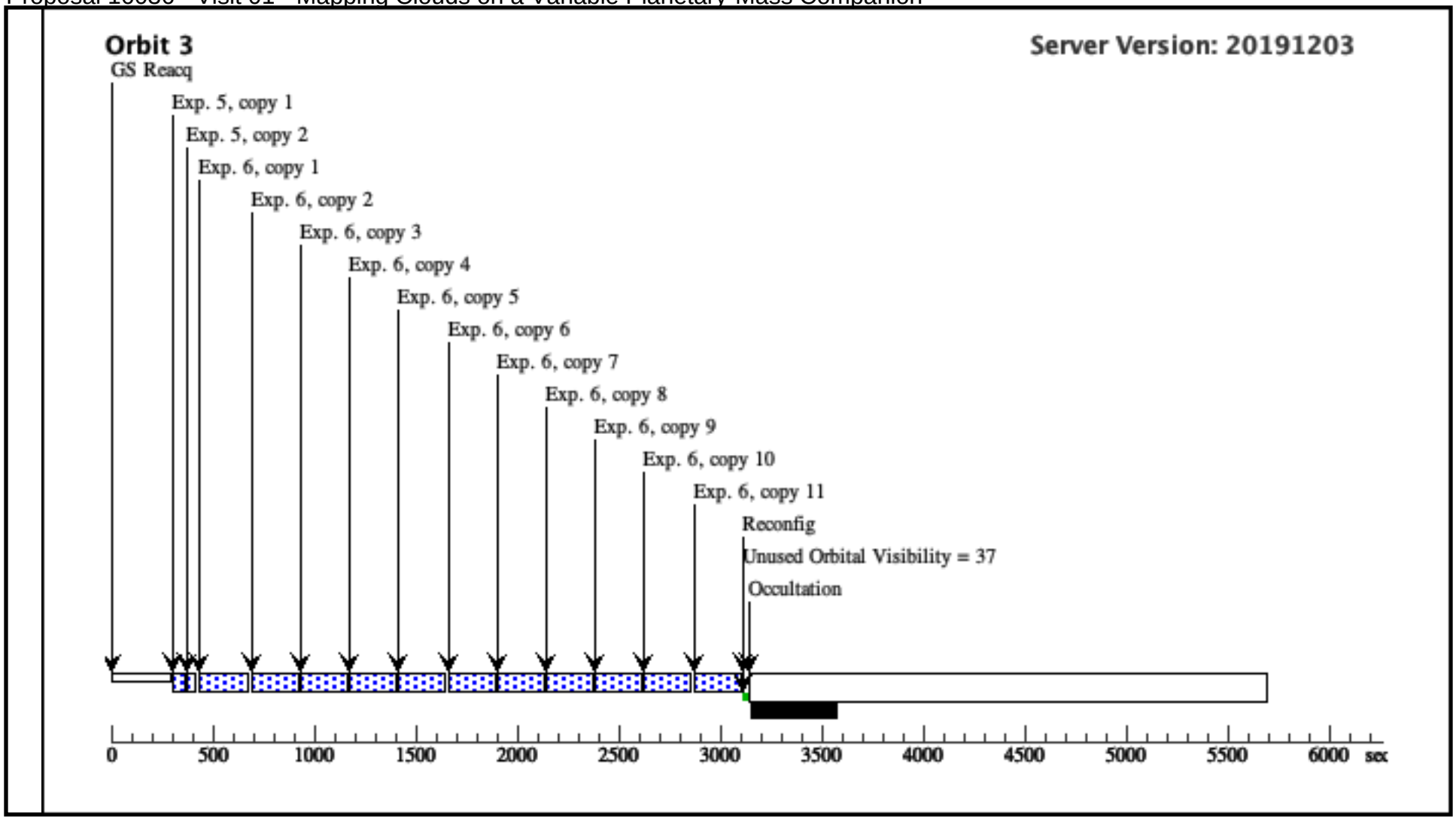
sec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Exp. 6, copy 8
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Exp. 6, copy 10
Exp. 6, copy 11
Reconfig
Unused Orbital Visibility = 37
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 16036, Visit 02, implementation Thu Apr 30 17:00:35 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: PCS MODE FINE; SAME ORIENT AS 01; AFTER 01 BY 2 Orbits TO 4 Orbits

Fixed Targets

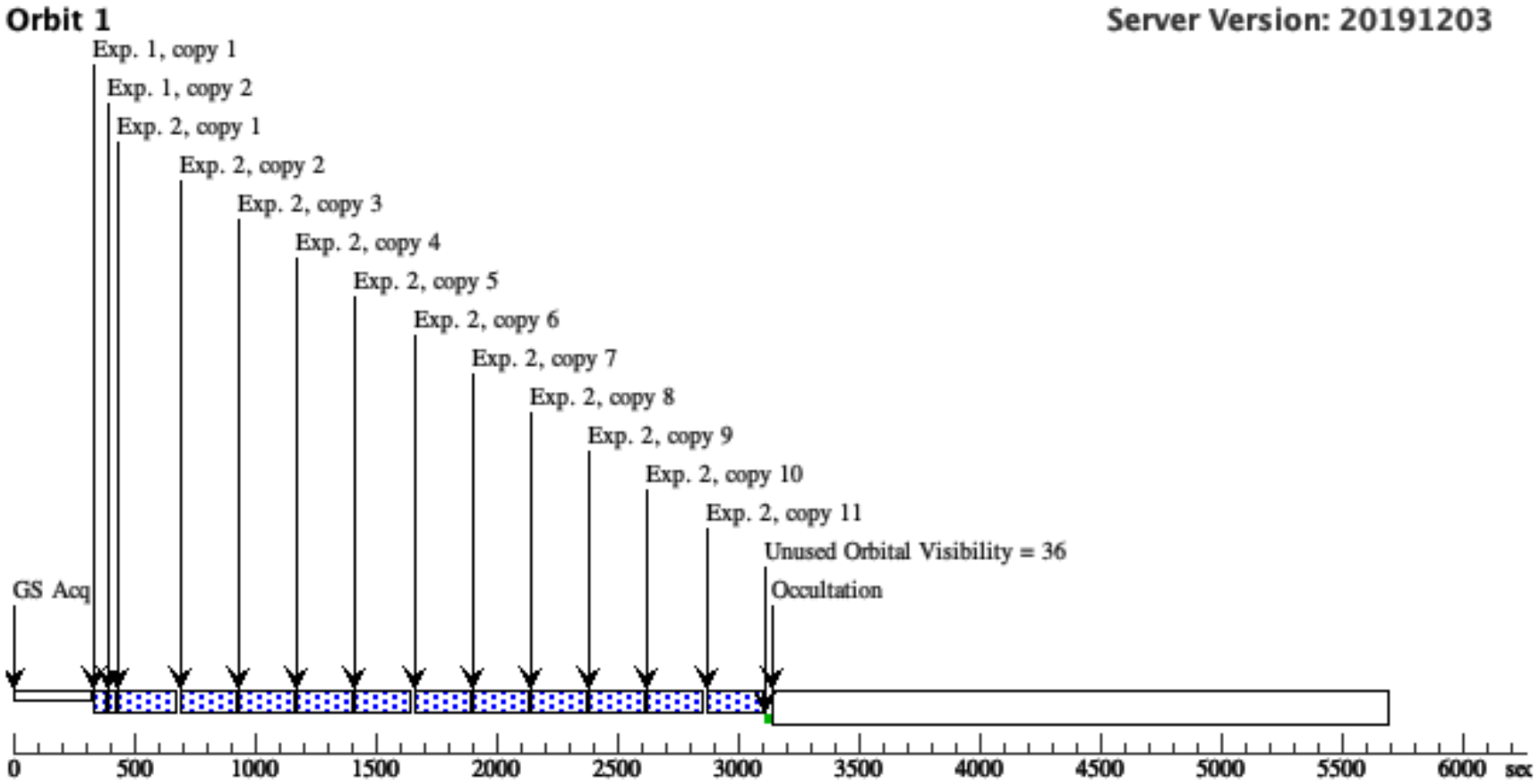
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	VHS1256-1257B	RA: 12 56 1.4656 (194.0061067d) Dec: -12 57 31.65 (-12.95879d) Equinox: J2000	Proper Motion RA: -285.4 mas/yr Proper Motion Dec: -189.2 mas/yr Epoch of Position: 2019.85	V=22 J=16.66 mag	Reference Frame: ICRS

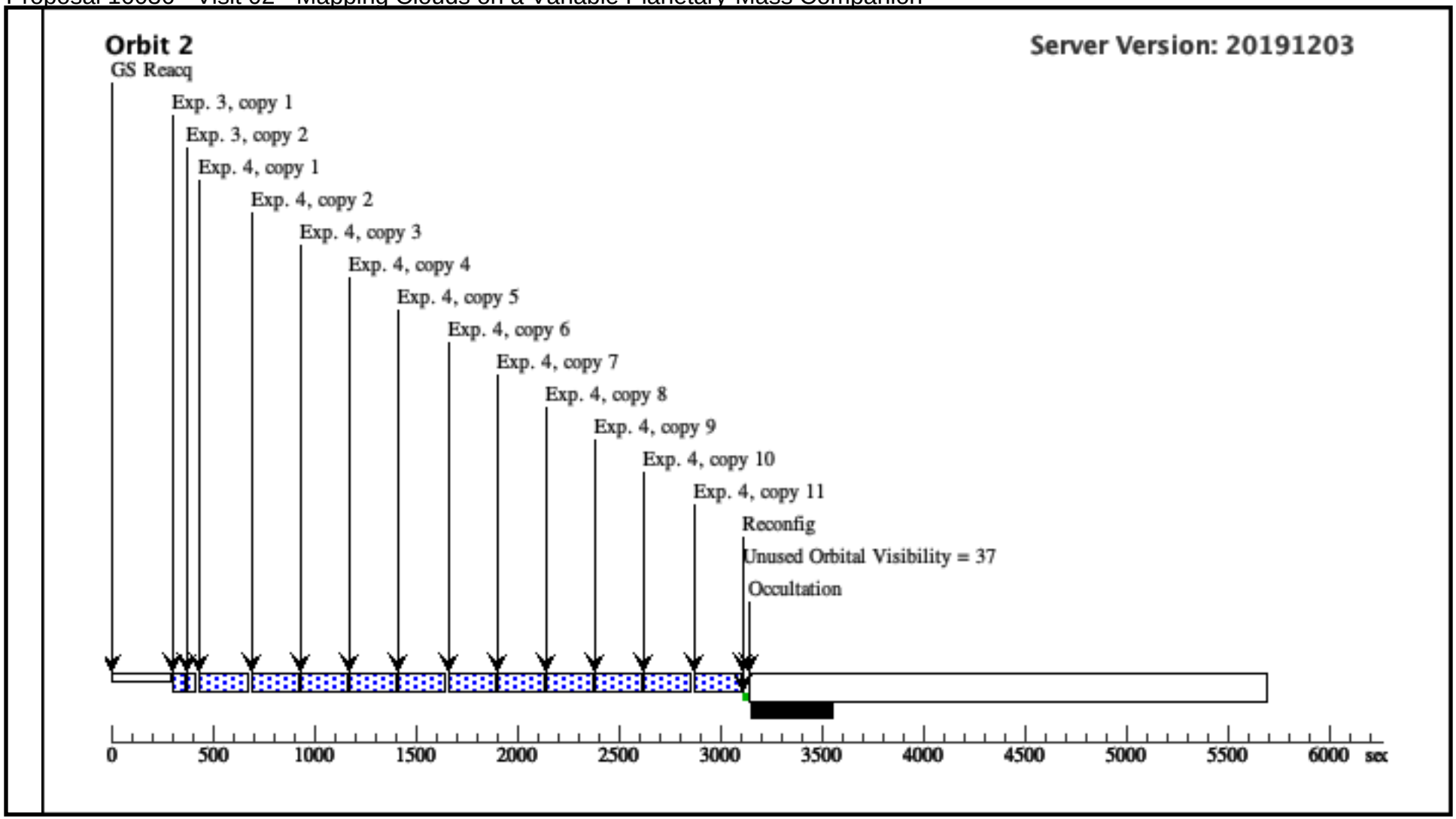
Comments:
Category=STAR
Description=[BROWN DWARF, EXTRA-SOLAR PLANET]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	F132N	NSAMP=4; SAMP-SEQ=SPAR S10			22.317276 Secs X 2 (44.635 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
2		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS 25; NSAMP=11			223.738205 Secs X 11 (2461.12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]*	***[1]***
3		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	F132N	NSAMP=6; SAMP-SEQ=SPAR S10			37.01025 Secs X 2 (74.02 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[2]***
4		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS 25; NSAMP=11			223.738205 Secs X 11 (2461.12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]*	***[2]***

Orbit Structure

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Exp. 4, copy 6
Exp. 4, copy 7
Exp. 4, copy 8
Exp. 4, copy 9
Exp. 4, copy 10
Exp. 4, copy 11
Reconfig
Unused Orbital Visibility = 37
Occultation
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500
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1500
2000
2500
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Visit

Proposal 16036, Visit 03, implementation Thu Apr 30 17:00:35 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: PCS MODE FINE; SAME ORIENT AS 01; AFTER 02 BY 2 Orbits TO 4 Orbits

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	VHS1256-1257B	RA: 12 56 1.4656 (194.0061067d)	Proper Motion RA: -285.4 mas/yr	V=22	Reference Frame: ICRS
		Dec: -12 57 31.65 (-12.95879d)	Proper Motion Dec: -189.2 mas/yr	J=16.66 mag	
		Equinox: J2000	Epoch of Position: 2019.85		

Comments:
Category=STAR
Description=[BROWN DWARF, EXTRA-SOLAR PLANET]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	F132N	NSAMP=4; SAMP-SEQ=SPARS10			22.317276 Secs X 2 (44.635 Secs)	
								[==>(Copy 1)]	***[1]***
								[==>(Copy 2)]	
2		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS25; NSAMP=11			223.738205 Secs X 11 (2461.12 Secs)	
								[==>(Copy 1)]	***[1]***
								[==>(Copy 2)]	
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								[==>(Copy 5)]	
								[==>(Copy 6)]	
								[==>(Copy 7)]	
								[==>(Copy 8)]	
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								[==>(Copy 10)]	
								[==>(Copy 11)]	
3		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	F132N	NSAMP=6; SAMP-SEQ=SPARS10			37.01025 Secs X 2 (74.02 Secs)	
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								[==>(Copy 2)]	
4		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS25; NSAMP=11			223.738205 Secs X 11 (2461.12 Secs)	
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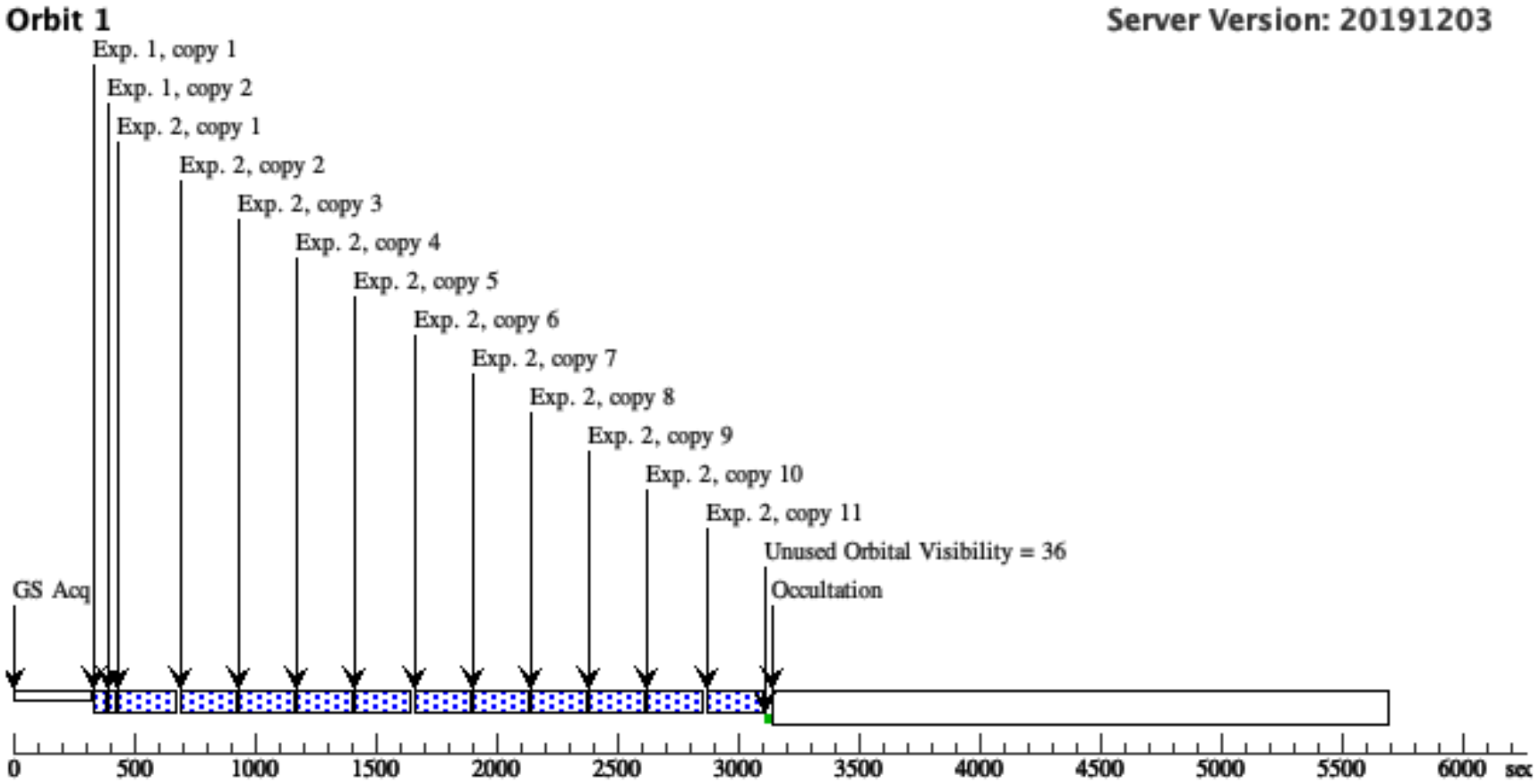
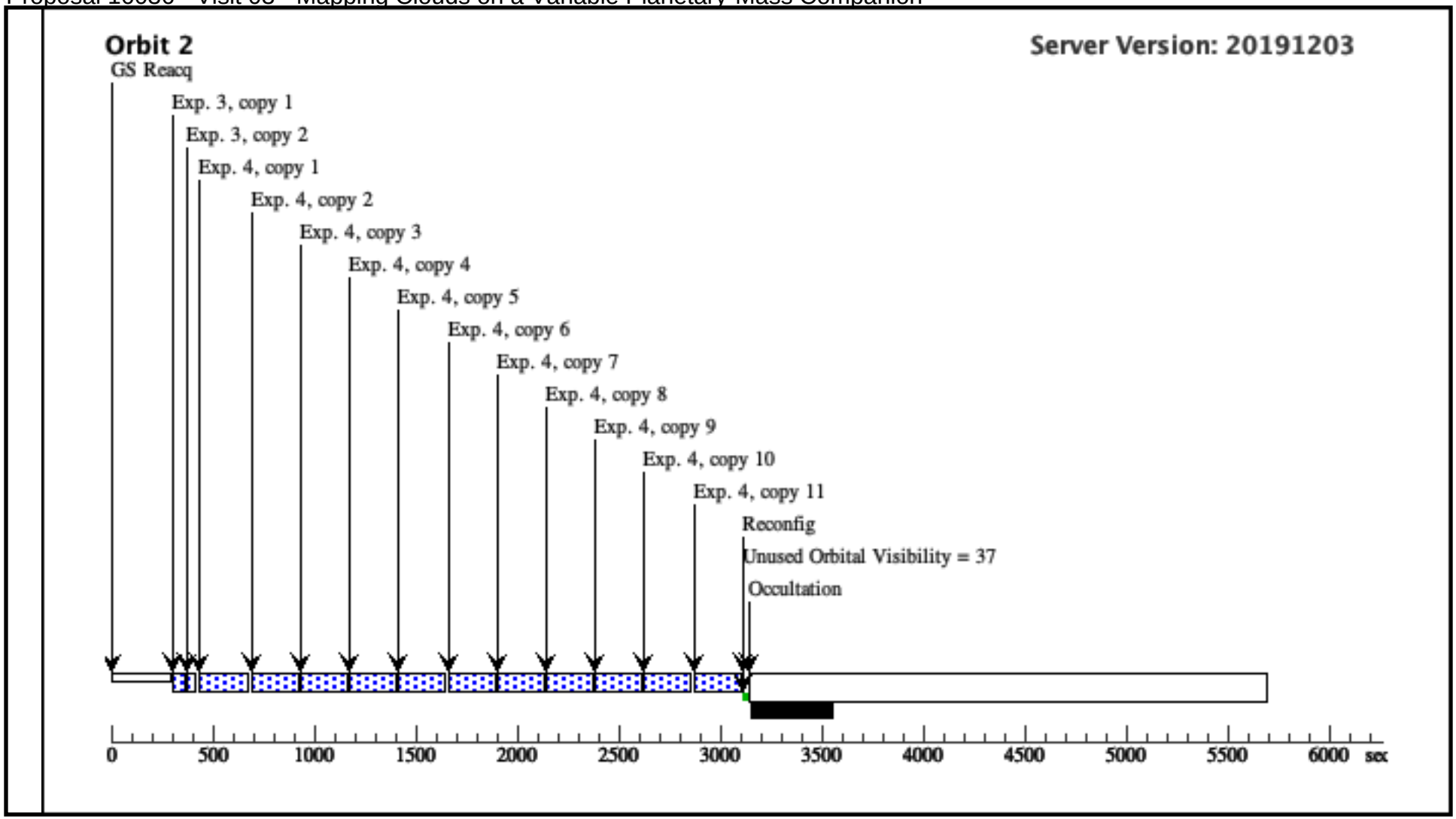
Orbit Structure

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Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 16036, Visit 04, implementation Thu Apr 30 17:00:35 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: PCS MODE FINE; SAME ORIENT AS 01; AFTER 03 BY 2 Orbits TO 4 Orbits

Fixed Targets

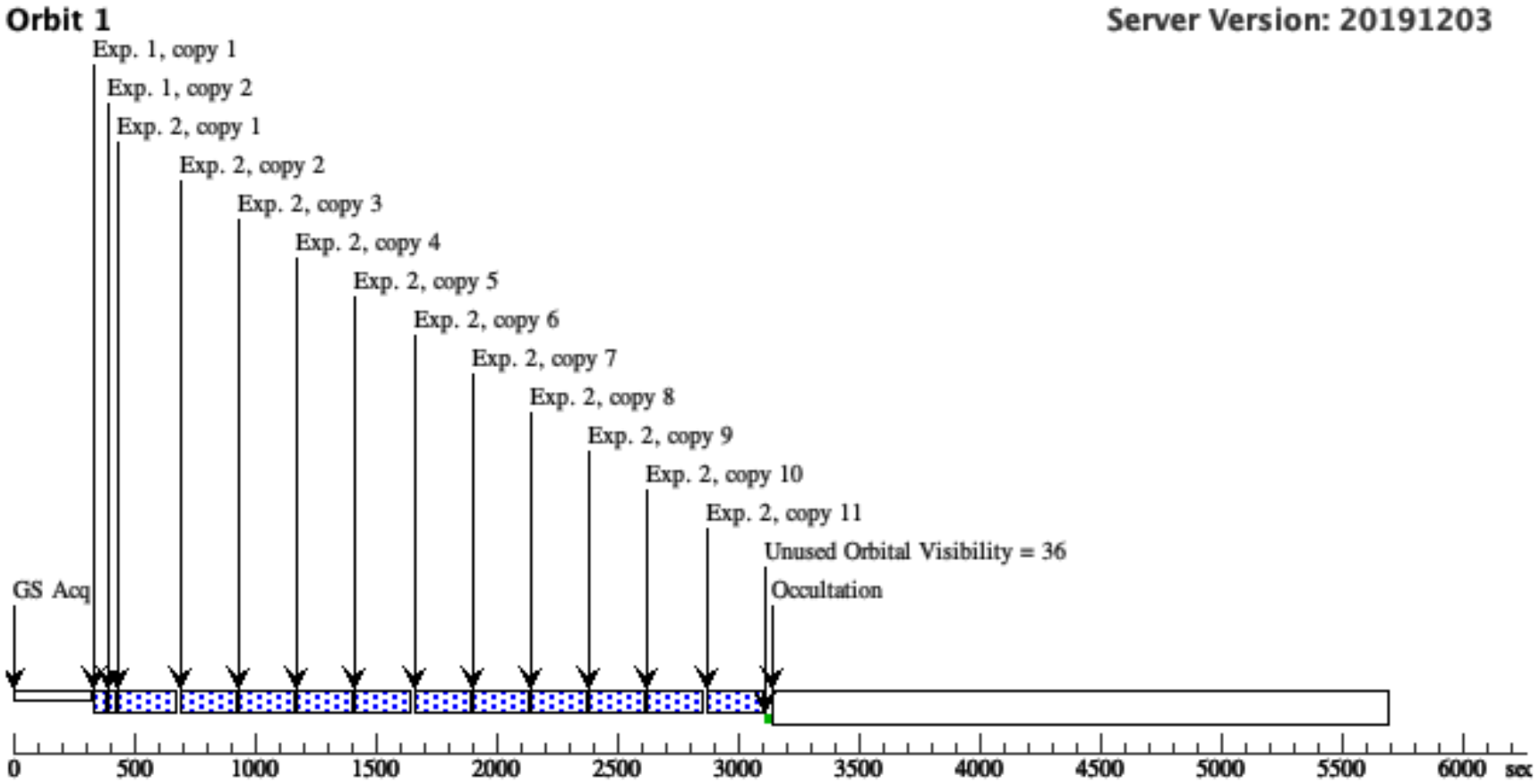
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	VHS1256-1257B	RA: 12 56 1.4656 (194.0061067d) Dec: -12 57 31.65 (-12.95879d) Equinox: J2000	Proper Motion RA: -285.4 mas/yr Proper Motion Dec: -189.2 mas/yr Epoch of Position: 2019.85	V=22 J=16.66 mag	Reference Frame: ICRS

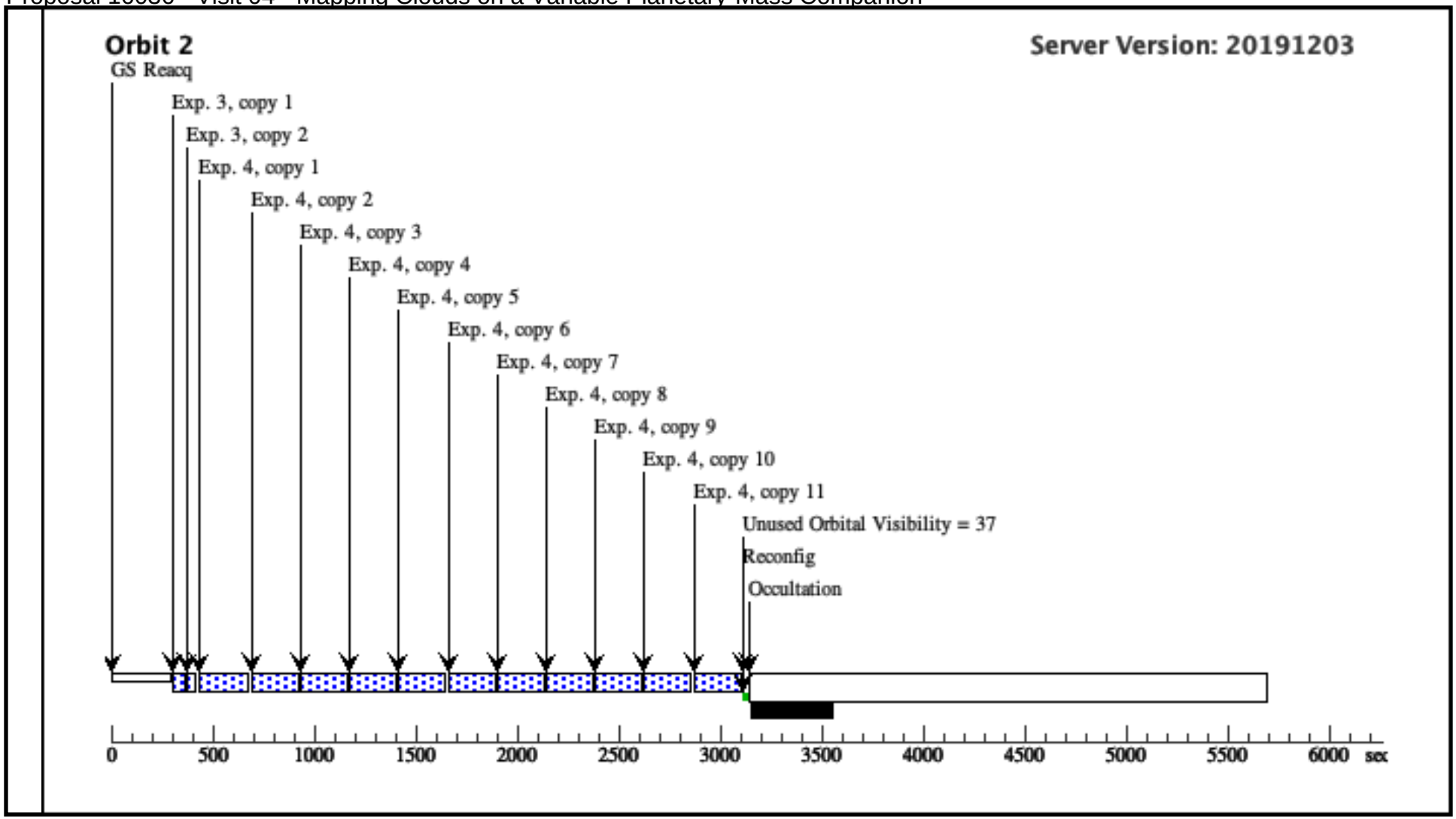
Comments:
Category=STAR
Description=[BROWN DWARF, EXTRA-SOLAR PLANET]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	F132N	NSAMP=4; SAMP-SEQ=SPAR S10			22.317276 Secs X 2 (44.635 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
2		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS 25; NSAMP=11			223.738205 Secs X 11 (2461.12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]*	***[1]***
3		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	F132N	NSAMP=6; SAMP-SEQ=SPAR S10			37.01025 Secs X 2 (74.02 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[2]***
4		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS 25; NSAMP=11			223.738205 Secs X 11 (2461.12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]*	***[2]***

Orbit Structure

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Unused Orbital Visibility = 37
Reconfig
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 16036, Visit 05, implementation Thu Apr 30 17:00:35 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: PCS MODE FINE; SAME ORIENT AS 01; AFTER 04 BY 5 Orbits TO 7 Orbits

Fixed Targets

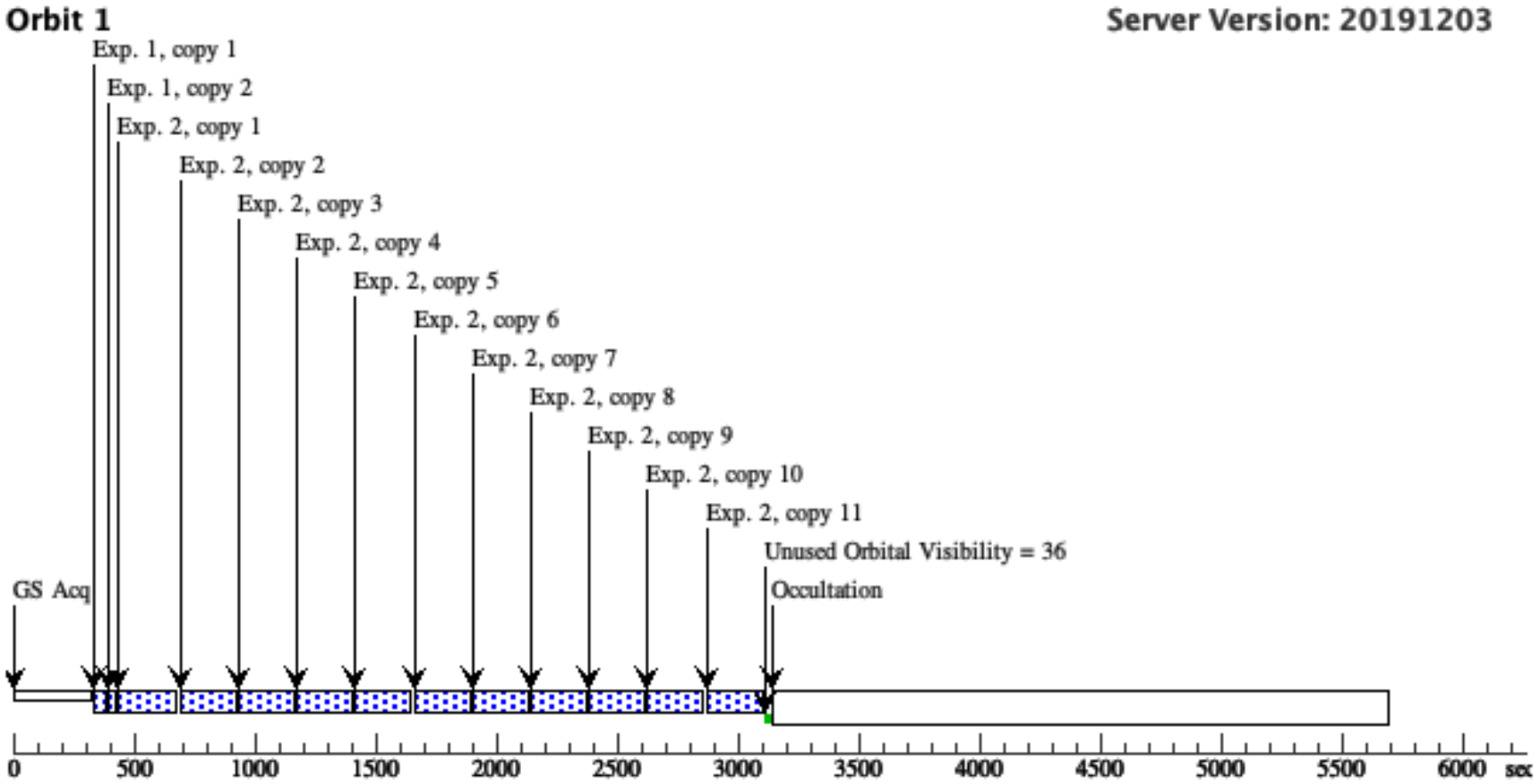
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	VHS1256-1257B	RA: 12 56 1.4656 (194.0061067d) Dec: -12 57 31.65 (-12.95879d) Equinox: J2000	Proper Motion RA: -285.4 mas/yr Proper Motion Dec: -189.2 mas/yr Epoch of Position: 2019.85	V=22 J=16.66 mag	Reference Frame: ICRS

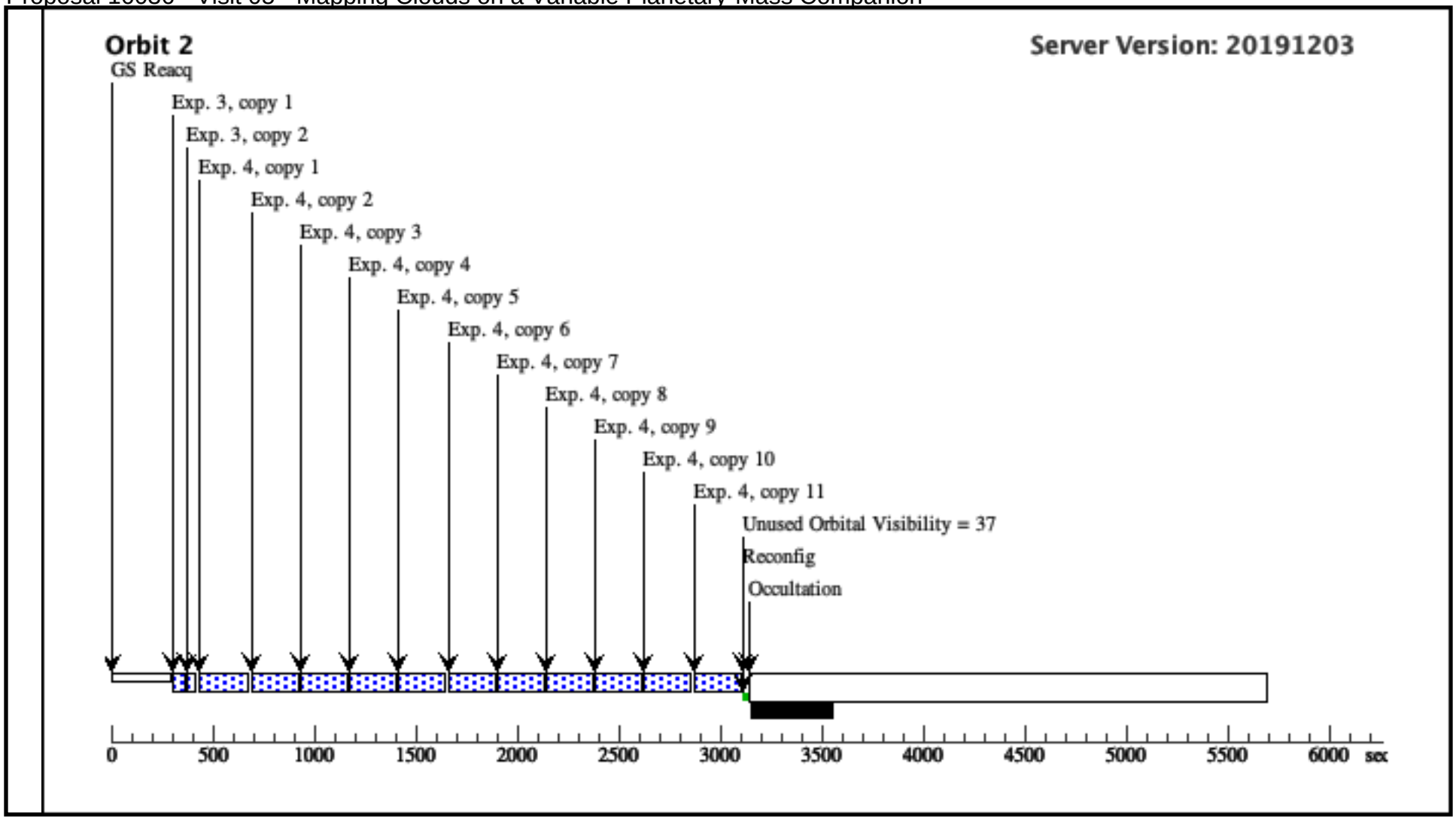
Comments:
Category=STAR
Description=[BROWN DWARF, EXTRA-SOLAR PLANET]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	F132N	NSAMP=4; SAMP-SEQ=SPAR S10			22.317276 Secs X 2 (44.635 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
2		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS 25; NSAMP=11			223.738205 Secs X 11 (2461.12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]*	***[1]***
3		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	F132N	NSAMP=6; SAMP-SEQ=SPAR S10			37.01025 Secs X 2 (74.02 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[2]***
4		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS 25; NSAMP=11			223.738205 Secs X 11 (2461.12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]*	***[2]***

Orbit Structure




Orbit 2
Server Version: 20191203
GS Reacq
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Exp. 3, copy 2
Exp. 4, copy 1
Exp. 4, copy 2
Exp. 4, copy 3
Exp. 4, copy 4
Exp. 4, copy 5
Exp. 4, copy 6
Exp. 4, copy 7
Exp. 4, copy 8
Exp. 4, copy 9
Exp. 4, copy 10
Exp. 4, copy 11
Unused Orbital Visibility = 37
Reconfig
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 16036, Visit 06, implementation Thu Apr 30 17:00:35 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: PCS MODE FINE; SAME ORIENT AS 01; AFTER 05 BY 5 Orbits TO 7 Orbits

Fixed Targets

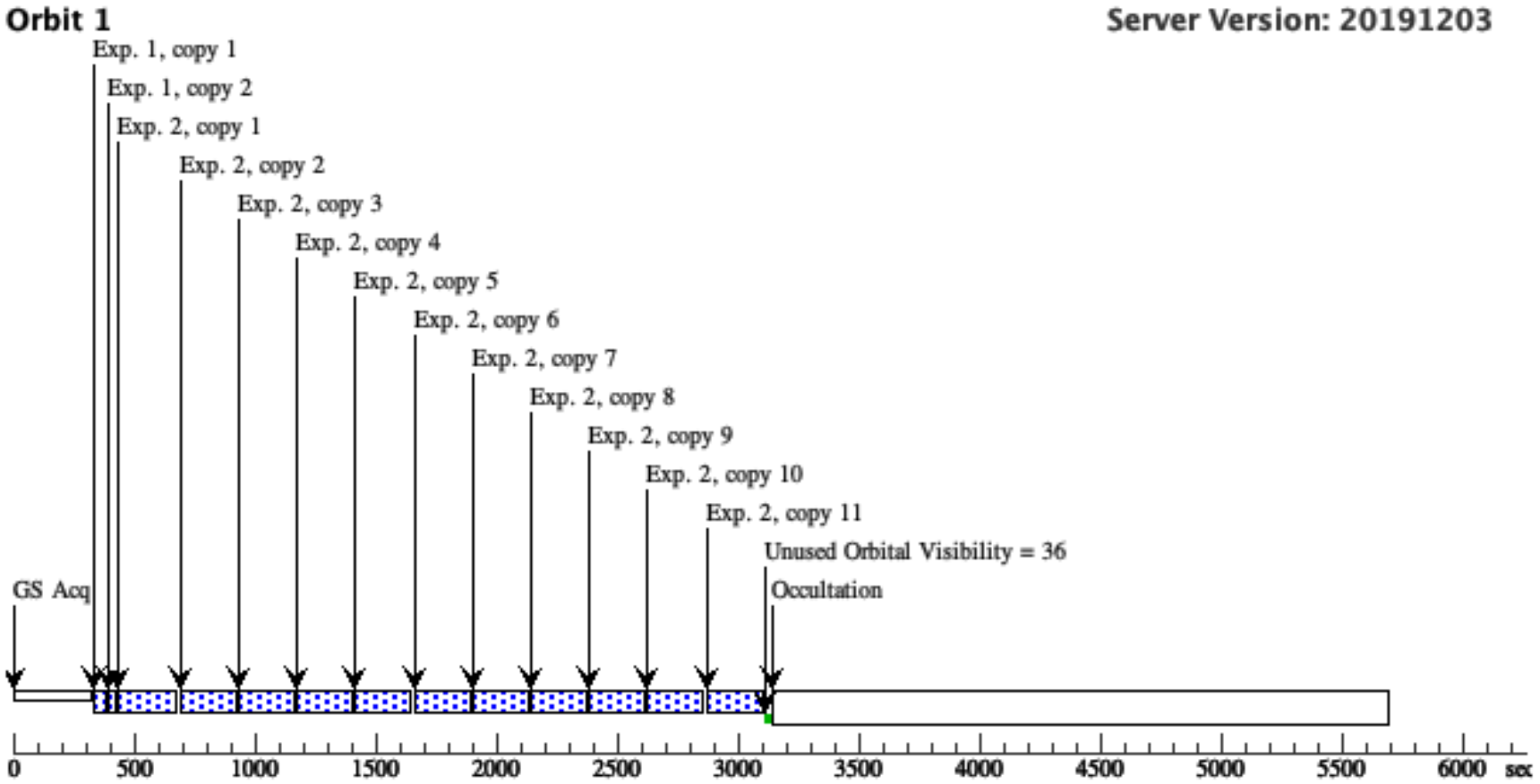
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	VHS1256-1257B	RA: 12 56 1.4656 (194.0061067d) Dec: -12 57 31.65 (-12.95879d) Equinox: J2000	Proper Motion RA: -285.4 mas/yr Proper Motion Dec: -189.2 mas/yr Epoch of Position: 2019.85	V=22 J=16.66 mag	Reference Frame: ICRS

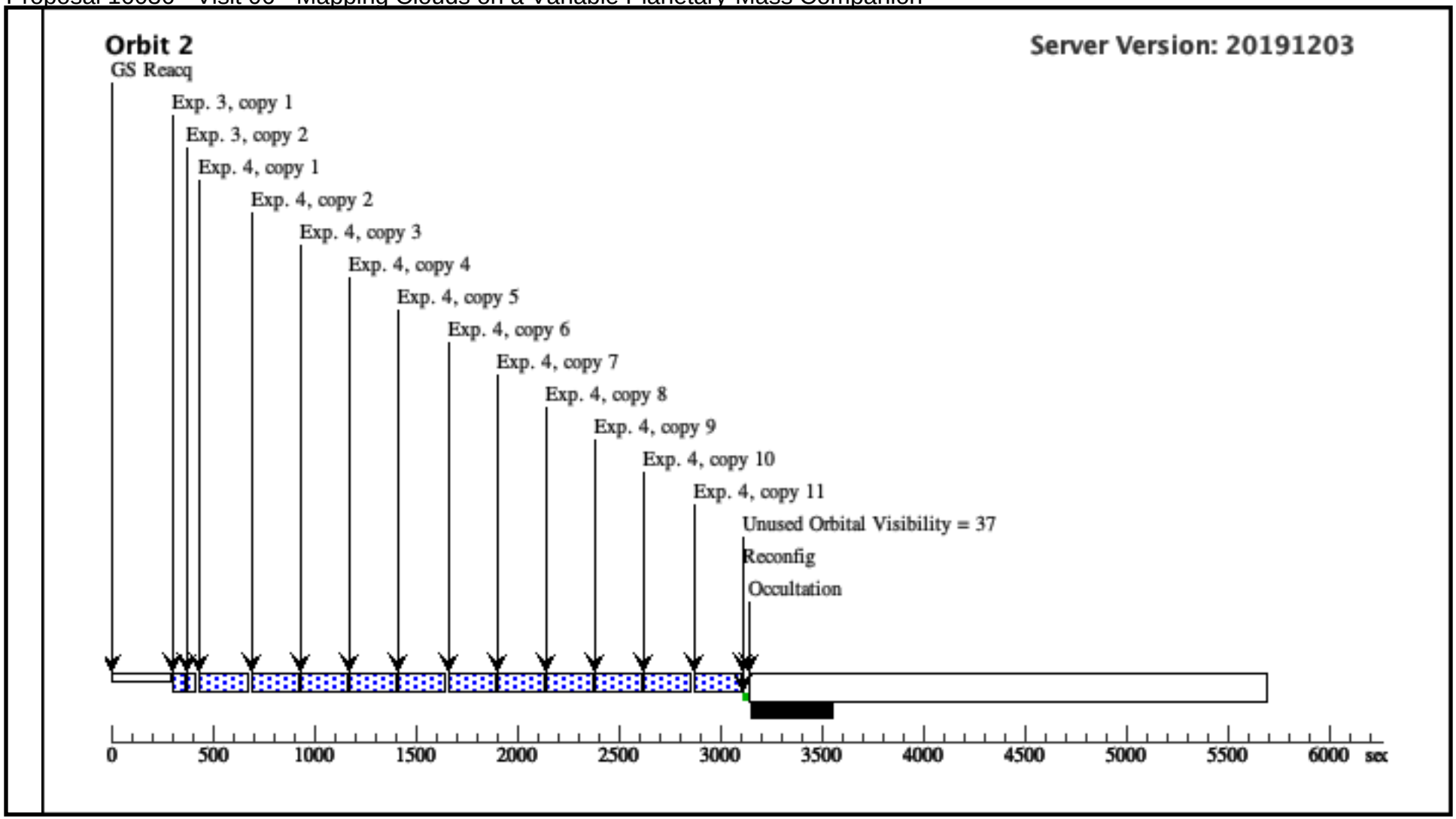
Comments:
Category=STAR
Description=[BROWN DWARF, EXTRA-SOLAR PLANET]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	F132N	NSAMP=4; SAMP-SEQ=SPAR S10			22.317276 Secs X 2 (44.635 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
2		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS 25; NSAMP=11			223.738205 Secs X 11 (2461.12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]*	***[1]***
3		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	F132N	NSAMP=6; SAMP-SEQ=SPAR S10			37.01025 Secs X 2 (74.02 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[2]***
4		(1) VHS1256-1257B	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS 25; NSAMP=11			223.738205 Secs X 11 (2461.12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]*	***[2]***

Orbit Structure




Orbit 2
Server Version: 20191203
GS Reacq
Exp. 3, copy 1
Exp. 3, copy 2
Exp. 4, copy 1
Exp. 4, copy 2
Exp. 4, copy 3
Exp. 4, copy 4
Exp. 4, copy 5
Exp. 4, copy 6
Exp. 4, copy 7
Exp. 4, copy 8
Exp. 4, copy 9
Exp. 4, copy 10
Exp. 4, copy 11
Unused Orbital Visibility = 37
Reconfig
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 16036, Visit 07, implementation Thu Apr 30 17:00:35 GMT 2020

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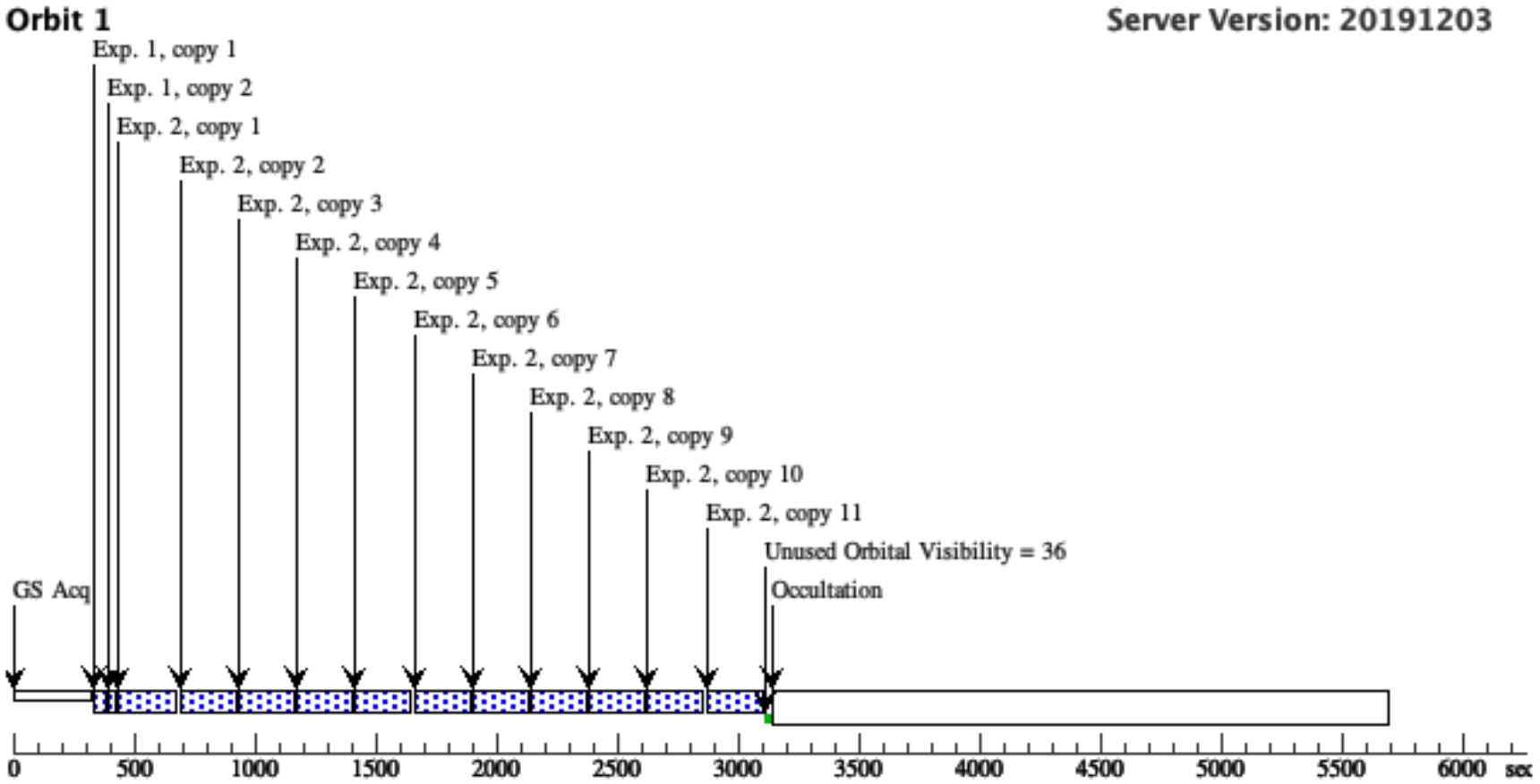
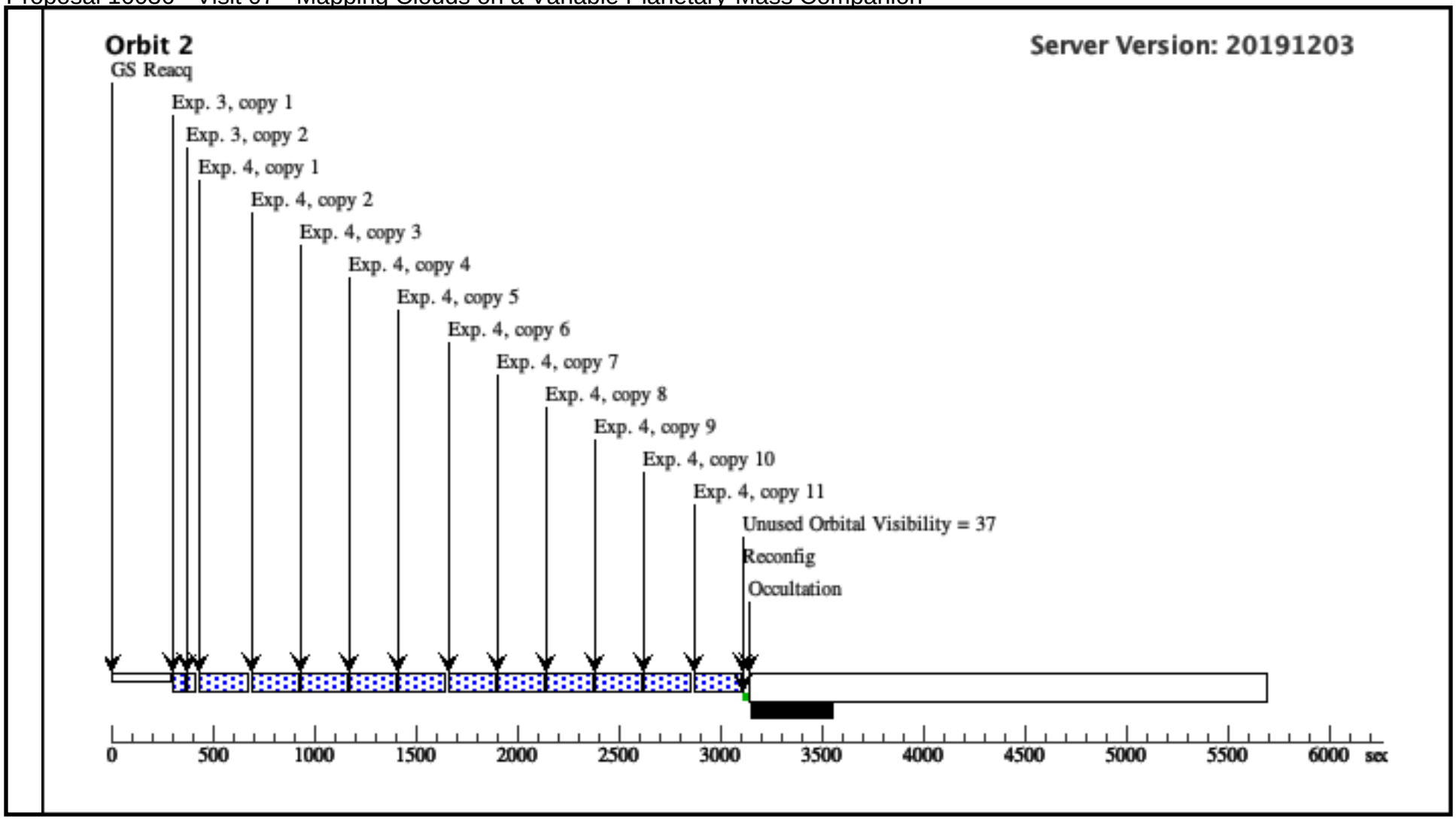
Orbit Structure




Orbit 2
Server Version: 20191203
GS Reacq
Exp. 3, copy 1
Exp. 3, copy 2
Exp. 4, copy 1
Exp. 4, copy 2
Exp. 4, copy 3
Exp. 4, copy 4
Exp. 4, copy 5
Exp. 4, copy 6
Exp. 4, copy 7
Exp. 4, copy 8
Exp. 4, copy 9
Exp. 4, copy 10
Exp. 4, copy 11
Unused Orbital Visibility = 37
Reconfig
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec